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Modern Road Surfacing

W. E. TURPIN

Subsoil is a serious offender among the destructive forces destroying the highway. The soils, which have the highest shrinkage rates and hold relatively large amounts of water, are the ones upon which the worst and greatest number of breakages occur.

The most important consideration in the preparation of subsoils is uniformity. The drainage of the subsoil is also a vital factor in the production of durable pavement. Improper drainage of soils which are not of uniform texture causes considerable trouble in cold weather because unequal frost heaving is very destructive. Unequal heaving is caused by the differences in soil texture and the amount of water available.

In sandy or silty soils gravity pulls the water through the soils rapidly, but in more compact soils the capillary action of water keeps the water from flowing downward and causes it to flow laterally. If this lateral flow passes over the side tile drainage it will cause serious damage to the pavement. When drainage trenches are back-filled with cinders, slag, or gravel the lateral flow is intercepted.

Subsoils of uneven texture may be remedied by excavating the roadbed and then replacing it as a fill. This reworked subgrade resists the attack of moisture extremely well.

In the construction of concrete roads scientific mixtures are gaining favor, but standard specifications are only forms indicating certain points to be covered, as requirements must be adjusted to satisfy local conditions.

Cement has generally been used in road work for:

(1) The construction of cement concrete foundations or base courses on which are placed many varieties of wearing surfaces.

(2) The construction of cement concrete pavements which carry traffic on the cement surface itself.

(3) The construction of cement bound macadam surfaces; in which case three general methods are used.

(a) A dry mixture of cement and sand is rolled into a prepared stone surface and then wetted and rolled until the resulting mortar is flushed to the surface.

(b) A layer of plastic mortar composed of cement and sand is sandwiched between layers



• Distributing bituminous material for surfacing.

—Courtesy Better Roads

of macadam, and then rolled until the mortar is worked into both courses of stone and sufficient mortar is worked to the surface to provide a proper finish.

(c) A thin layer of grout composed of water, sand, and cement is poured into a previously prepared macadam surface, and then rolled and otherwise manipulated until a proper finish is secured.

Of the above uses the first two are for roads and streets which carry a large volume of vehicular traffic accompanied by heavy wheel loads. The third is used for light or medium traffic. It gives better results than pure macadam roads, and is cheaper than regular concrete construction.

Smoothness, correct depth of pavement, and the quality of the concrete are the principal items to be controlled in concrete construction.

In the maintenance of cement roads, cracks and joints are filled with bituminous material at least once a year. Where a surface shows sign of disintegration, it is covered with a mixture of bitumen and aggregate. If the failure is of a critical nature, the area affected is replaced. High, early strength cements are especially desirable for this type of patch work.

The bituminous treatment of natural soil roads varies with the type of soil. Where a suitable type of bituminous material has been used on clay roads a distinct improvement has been effected at a reasonable cost. To produce any permanent improvement repeated surface treatments are required.

Oils used in this work should possess non-

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- Bituminous surface built over a stabilized base. Base stabilization has been a standard procedure since 1938.

—Courtesy Better Roads

MODERN ROAD SURFACING

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emulsifying characteristics but need not be highly bonding after application. Materials for this purpose are applied after the road has been properly shaped.

Sand-clay roads are composed of natural or artificial mixtures of sand and clay in such a proportion as to produce a wearing course vastly superior to either all sand or all clay, but an untreated sand-clay road becomes softened during prolonged wet spells and is very dusty in dry weather. To improve such roads the surface is covered with a coat of asphaltic oil of low viscosity to harden and moisture proof the road and to provide a surface to which asphaltic tar of high viscosity is applied. A mineral aggregate is then spread on top to produce a thin wearing course, knitted to and overlying the old sand-clay road.

This type of road requires constant observation to detect and correct defects as they develop because deterioration takes place rapidly if the original trouble is not promptly eliminated.

Most gravel roads are at their best when the gravel is slightly moist but not saturated with water. If they could be kept permanently in this condition their traffic carrying capacity would be much higher and their cost of maintenance would

be greatly reduced. The basic use of bituminous material in gravel roads appears to be the substitution of bituminous material for that amount of water which would produce the most satisfactory conditions.

In the treatment of an existing traffic-bound gravel road, the old road is covered with an asphaltic oil and then the bituminous material and aggregate are mixed until a soil of uniform color and texture is obtained. Compaction is secured under traffic during blading to maintain a smooth even surface.

Maintenance consists of blading with a road machine similar to the maintenance of an ordinary gravel road.

Brick surfaces are used extensively in the United States for roads bearing heavy traffic. For the most part roads surfaced with brick require a concrete foundation, but it has been found that where drainage and climatic conditions are suitable it has been possible to construct satisfactory brick pavements on sand or well drained earth subgrades.

The bricks are laid upon the smooth even base and then sealed into place with a filler. A bituminous filler has been found to work more satisfactorily than cement fillers. Asphalt is generally used.

These practices are now in general use by road contractors for highway construction.



- Mixing soil and asphalt and compacting the stabilized mixture.

—Courtesy Better Roads